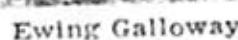
BRICK is usually made from clay or shale. It is a con-
...ction material that has been hardened into the
...pe of a block. Some brick is made of concrete, or of a
...ture of sand and hydrated lime. Such brick is used
...building walls.

Good building bricks are uniform in color and size, ... have a pleasing appearance. They are free from ...cks and irregularities. Well-made bricks produce a ...tallic ring when struck with a hammer. They have ...ough strength to resist crushing and bending, and ...sorb little water. They resist the action of fire and ...st. Good bricks also *bond* (unite) well with *mortar*, ...e material used to join bricks in building.

How Bricks Are Made

Forming the Bricks. After clay for bricks has been ...g, it is crushed. Manufacturers then grind the clay ...oroughly in a rotating pan with heavy rollers. This ...achine is called a *dry pan*. The clay is then screened to



Ewing Galloway

Bricks have been used for building since before the time of the ancient Egyptians. This fence, a fine example of the bricklayer's art, was designed by Thomas Jefferson. It stands on the University of Virginia campus and is called the *Serpentine Wall*.

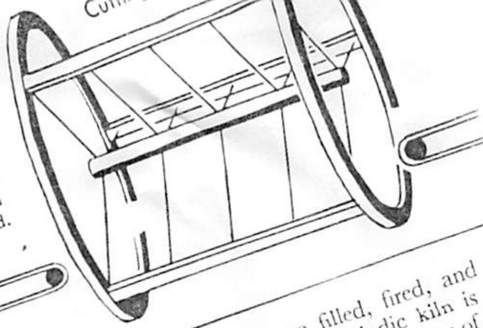
remove the coarse material. Water is added to the clay, and revolving knives chop and mix the clay into a plastic mass. This mass is molded into bricks by (1) the stiff-mud, (2) the soft-mud, or (3) the dry-press process. The important difference in these methods is the amount of water used. After the bricks are formed, they are dried and then *fired* (burned).

A mobile brick factory has been invented. The brickmaking machine is mounted on a truck, and is operated by the truck's engine. The apparatus scrapes clay from the ground, mixes it, and forms it. The machine smooths the ground as it goes along, and the bricks are stacked there to dry in the sun.

Stiff-Mud Process is used to make most building bricks. Water is added to the clay to make it a stiff mud. The brickmaking machine forces the clay through an opening to form a long ribbon. The ribbon of clay is cut into brick sizes by a *brick cutter*, an apparatus with evenly spaced wires that slice through the stiff

...ARE MADE

...**Machines** grind and ...d force it through an ... a conveyer belt. A ...e cuts the bricks to ... bricks are dried and ...ln where they are baked.



...e clay by attach-
...ing machine. Re-
...d easier to handle.
...handmade brick.
...to prevent the clay
...mixed to make a soft
...nolds.
...t *face* brick, the brick
...ined by this method.
...o the clay to make it
...into molds.
...ve been formed, they are
...r heated to temperatures
...150° C) circulates through
...ed air removes much of the
...slowly to prevent extensive
...ying may take from one day
...n the amount of water in the

...hen the bricks are dry, they
...alled *kilns*, which are heated
...r gas. The temperature in the
...until it reaches 1600° to 2000°
...higher, depending on the kind of
...articles become partly melted and
...g the brick hard and strong.
...so well burned that they will not
...n they are soaked. *Medium-burned*
...water, and *soft-burned bricks* absorb
...s that are high in iron compounds
...Clays with a low iron content are used
...am-colored brick. Variations in color
...d with some clays by *flashing* the brick
...e burning. In flashing, the fires are made
...make the iron in the clay darker.
...urning bricks are either the periodic or
...ype. *Periodic kilns* are usually round and

have a domed top. They are filled, fired, and then emptied. The simplest kind of periodic kiln is made by stacking the unburned bricks to form rows of arched holes or tunnels. The fires, built in the holes or tunnels, pass upward through the bricks. The outside wall is sealed by plastering it with mud.

Continuous kilns may be of the chamber or car-tunnel types. The *chamber kiln* is formed by a number of periodic kilns placed in line. There is a single firebox located outside the kilns, and flues conduct the heat to the individual chambers. Heat for any individual chamber can be turned on or off at will. Thus, it is possible to have many stages of firing and cooling going on at the same time in different chambers. The *car-tunnel kiln* consists of a long tunnel divided into three chambers, one for preheating, one for firing, and one for cooling. The bricks are placed on cars that are pushed through the tunnel, stopping in each chamber. Thus, the bricks are gradually heated and cooled as they move through the tunnel.

Kinds of Brick

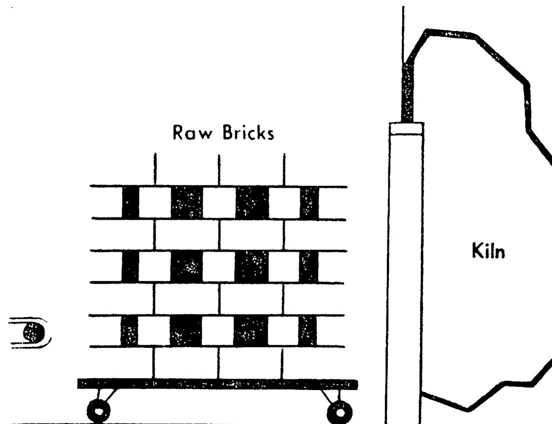
Styles. Clay and shale bricks of various colors are produced for use as *face brick*, to be used on the exposed face of a wall. *Common brick* (*backing brick*) is used mainly for the backs of walls. *Firebrick* (*refractory bri*... is used to line furnaces and kilns because it withsta... high temperatures.

Face bricks may be smooth or their exposed ... may be roughened by *wire cutting* (scratching), ... *tapestry brick*. Manufacturers make smooth-faced g... *bricks* that are glazed by being exposed to gases ... duced by throwing salt into the fires of the ... *Enameled bricks* are made by coating the surfa... smooth, unburned clay brick with a material that ... to a glass when the bricks are fired. Enameled bri... have a smoother surface than salt-glazed bri...

BRICKLAYING

Bricks are laid in horizontal layers called courses. A mason's line is used to make sure the courses are straight. Bricklayers use a trowel to apply mortar between the bricks to hold them together and make the wall watertight. They arrange the bricks in designs, called bonds, for strength.





cost more. Builders find them suitable for swimming pools and other places where wall tile might be used.

Sizes. At one time, bricks were made in various sizes and shapes, depending on the locality in which they were made. In the United States the standard size for common brick is $2\frac{1}{4}$ inches (5.7 centimeters) thick, $3\frac{3}{4}$ inches (9.5 centimeters) wide, and 8 inches (20 centimeters) long. Bricks cast to specified sizes and shapes are called *molded bricks* and are used for ornamental purposes, such as window trim, moldings, arches, and chimneys.

Bricklaying

Bricks usually are laid on their flat sides to form *courses* (horizontal layers) separated by *mortar joints* from $\frac{1}{8}$ to $\frac{1}{2}$ inch (3 to 13 millimeters) thick. A *bricklayer*, who puts the bricks in place, is assisted by a *hod carrier*, who delivers bricks and mortar to the bricklayer. The construction formed is called *brickwork* or *brick masonry*.

Bonding. Bricks are arranged so that they lap over each other to stagger the vertical joints. Thus, it is possible to distribute loads over a large area. The various arrangements are called *bonds*. Bricks laid with the ends

contains portland cement for strength, hydrated lime for workability, sand for economy and volume, and water for workability and the necessary chemical reactions. A commonly used mortar consists of one part portland cement, one part hydrated lime, six parts sand, and enough water to make the mixture soft and workable. See CEMENT AND CONCRETE.

Preserving Brick

Brick construction will last hundreds of years if satisfactory materials and construction methods have been used. The brick also must be cared for properly. Weather will wear away the mortar from the joints and they should be repaired periodically. An unsightly whitish discoloration, known as *efflorescence*, sometimes appears on the brick. Efflorescence results when salts from within the brick and mortar are carried to the surface by water. The water evaporates, but the salts remain and cause the brick to chip and crumble. The deposits can be removed by scrubbing with diluted hydrochloric acid solution, then rinsing with plain water.

History

Brick is the oldest manufactured building material. Sun-dried brick was used in the Middle East by 6000 B.C. The chief occupation of the Israelites during their captivity in Egypt was making sun-dried brick from clay taken from the Nile River. In the United States, bricks were made in Virginia as early as 1612. Until the 1900's, brick was used to pave streets and sidewalks, and to build chimneys for industrial plants. But bricks have largely been replaced by concrete and asphalt for paving, and by steel for chimneys. GEORGE W. WASHA

See also ADOBE; BUILDING TRADE; CLAY.